

**COST-EFFECTIVE USE OF RODEO<sup>®</sup> HERBICIDE FOR MANAGING CATTAIL MARSHES USED BY ROOSTING BLACKBIRDS**

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In the northern Great Plains, sunflower losses due to blackbird predation can be economically significant (Hothem et al. 1988). In 1986 and 1987, sunflower damage averaged 6.0% per field in a 798 km<sup>2</sup> (308 mi<sup>2</sup>) area in northeastern Benson and west-central Ramsey counties, North Dakota (Linz et al. 1989). Twenty percent of surveyed fields received >10% damage (Linz et al. 1989). In 1990, 14% of North Dakota's sunflower growers suffered bird damage greater than 10% (Lamey et al. 1992). At \$0.10/lb and a potential yield of 1500 lb/acre, an 80-acre sunflower field receiving 10% bird damage would cost a grower \$1200.00

Many techniques developed to reduce sunflower damage are used ineffectively because they require a persistent, time-consuming effort by the grower (Besser 1985). Thus, new management techniques for dispersing and reducing blackbird damage to sunflower must not only be environmentally safe, cost-effective, and practical but also easily implemented (Besser 1978).

In 1988, Denver Wildlife Research Center biologists speculated the strong association between dense cattail marshes and sunflower damage by blackbirds (Otis and Kilburn 1988) could be exploited to disperse and reduce blackbird populations. The concept was simple: alter the habitat preferred by roosting blackbirds (i.e., dense cattail marshes) and local blackbird numbers would decline (Linz and Bergman 1990). In August 1989, Rodeo<sup>®</sup> herbicide (a.i., glyphosate) was used successfully to fragment 4 dense cattail marshes and discourage their use by roosting blackbirds (Linz et al. 1992b). Use of Rodeo<sup>®</sup>, a registered trademark of Monsanto Company, St. Louis, MO, does not imply endorsement by the U.S. Department of Agriculture or North Dakota State University.

Since 1990, scientists from Denver Wildlife Research Center, North Dakota State University, and South Dakota Fish and Wildlife Cooperative Research Unit have been developing the use of Rodeo<sup>®</sup> herbicide for fragmenting cattail marshes (Linz et al. 1989, Linz et al. 1992a). Our data show that cattail marshes with 70% open water and 30% emergent vegetation harbor relatively few roosting blackbirds (Linz et al. 1992a, Linz et al. 1992b). Conversely, waterfowl appear to benefit from fragmenting

monotypic stands of emergent vegetation (McEnroe 1992, Solberg and Higgins 1993).

In 1991, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, North Dakota Animal Damage Control; U.S. Department of Interior, U.S. Fish and Wildlife; and private landowners began fragmenting cattail marshes with Rodeo<sup>R</sup> herbicide (Huffman 1992, McEnroe 1992) to reduce blackbird numbers and improve waterfowl habitat. We provide information that may be used to determine if altering blackbird habitat with Rodeo<sup>R</sup> is a cost-effective method of reducing sunflower damage.

Rodeo<sup>R</sup> herbicide applied to marshes to reduce cattail stands and blackbird populations may be cost-beneficial for sunflower growers, especially if costs are amortized over several years. However, several factors should be considered before making a decision to use Rodeo<sup>R</sup>. First, how many birds are using the marsh? The grower should estimate the roosting population in each marsh by counting the birds as they leave the roost in the morning or as they enter the roost in late-afternoon.

Second, how much damage will these birds cause? Assuming the daily sunflower consumption by 1 blackbird is 10 g to 14 g (1/3 oz - 1/2 oz; Besser 1979), each day 10,000 birds will remove about 93 kg to 142 kg (206 lb - 313 lb). If this flock feeds on sunflower for 45 days, the birds will damage 4,210 kg to 6,390 kg (9,281 lb - 14,087 lb) of sunflower, valued at \$928 to \$1,409 (Fig. 1). Obviously, 50,000 blackbirds will cause 5 times as much damage as 10,000 birds (\$4,640 - \$7,045; Fig. 2). If alternative foods (e.g., stubble grain fields, corn) are not available, consumption of sunflower may be greater than 14 g per day.

Third, how big is the area of the marsh used by roosting blackbirds? Generally, blackbirds roost in areas that contain both dense cattails and water. Thus, it may not be necessary or cost-effective to treat the entire marsh for the purpose of eliminating the blackbird roost. Cost of aerially applying Rodeo<sup>R</sup>, using 5.3 L/ha (2.25 qt/A), is about \$136/ha (\$55/A; Table 1); most of this cost (81%) is for the herbicide. The cost of treating 70% of an 12-ha (30 A) marsh with 5.3 L/ha Rodeo<sup>R</sup> is \$1155 (Fig 3).

Finally, to maximize cost-effectiveness, the sunflower grower should compare the number of blackbirds using a given marsh with the area of cattails that must be treated to disperse the birds. Use Fig. 4 to make this comparison. For example, spraying a 8-ha (20 A) area of cattails that harbors fewer than 4,000 birds may not be cost-effective unless the treatment is effective for more than 3 years (Fig. 4). On the other hand, if this marsh harbored about 12,000 birds, the grower could recoup treatment costs in 1 year.

The rate of cattail reinvasion is dependent on water levels. Thus, it is difficult to predict the rate of cattail reinvasion for individual marshes. However, we have observed that in marshes where water levels are maintained at >30 cm (12 in) cattails reinvasion is slow; whereas, shallow water or mud-flats are conducive to rapid reinvasion by the cattails (Merendino and Smith 1991, Linz et al. 1992).

## Recommendations

1. To maximize cost-effectiveness, limit treatment to cattail marshes containing water and traditionally harboring large numbers of blackbirds.
2. Aerially apply Rodeo<sup>®</sup> at 5.3 L/ha (2.25 qt/A).
3. At least 70% of the cattail should be killed by spraying 15 m (50 ft) wide strips and skipping about 6.4 m (21 ft) between sprayed strips.
4. For maximum effectiveness, apply Rodeo<sup>®</sup> from early August until first frost.

## Status of Marsh Management Research

In 1990-91, Henry (1992) conducted field and laboratory studies on the response of aquatic invertebrates to Rodeo<sup>®</sup> herbicide. Number of invertebrates did not differ between untreated and treated marshes. Laboratory experiments corroborated the field tests.

In 1993, scientists from NDSU and the DWRC will complete data gathering on the effects of Rodeo<sup>®</sup> treatment on marsh water quality, aquatic invertebrate populations, and waterfowl populations. Studies on the effects of cattail management on Ring-necked Pheasants (*Phasianus colchicus*) and the efficacy of managing blackbird roosting sites for dispersing and reducing sunflower damage are scheduled for completion in 1995.

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Table 1. Cost of treating 20 acres of cattails with aerially applied Rodeo<sup>R</sup> herbicide.

Spray Component	Unit Cost	Cost	Cost
		1 Acre	20 Acres
Rodeo <sup>R</sup>	\$86.50/gal	\$48.66 <sup>a</sup>	\$973.12 <sup>a</sup>
Surfactant	\$14.95/gal	\$ 0.37	\$ 7.48
Drift Retardant	\$13.50/gal	\$ 0.84	\$ 16.88
Application	\$ 5.00/acre	\$ 5.00	\$100.00
Total Cost		\$54.87	\$1097.48

<sup>a</sup>2.25 qt/acre

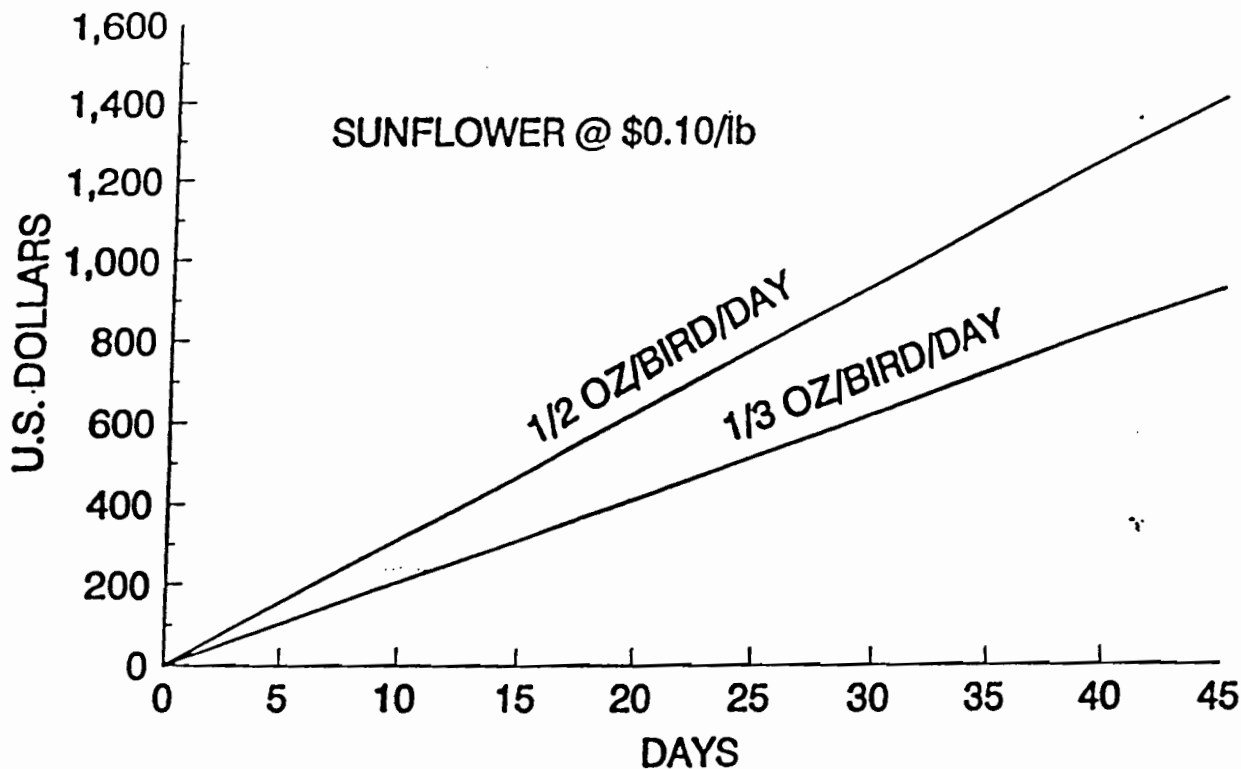


Fig. 1. Damage caused by 10,000 blackbirds feeding on sunflower.

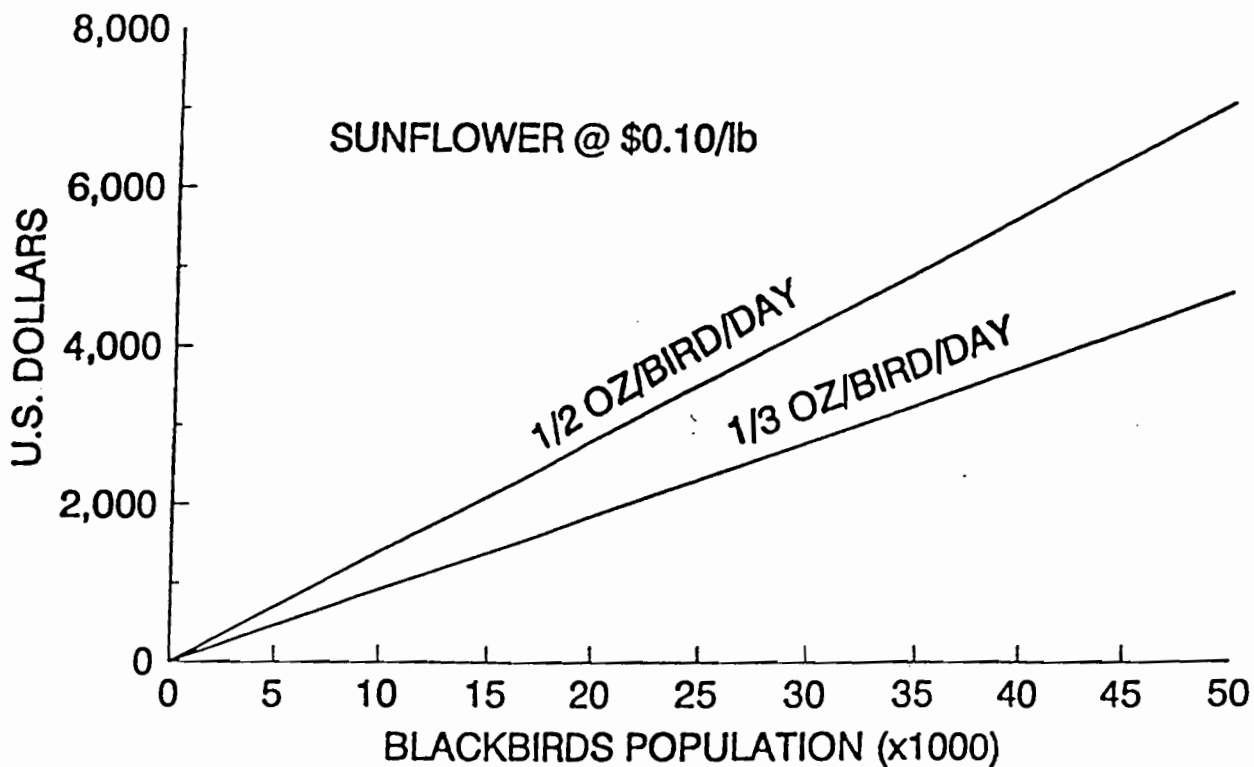


Fig. 2. Damage caused by various numbers of blackbirds feeding on sunflower for 45 days.

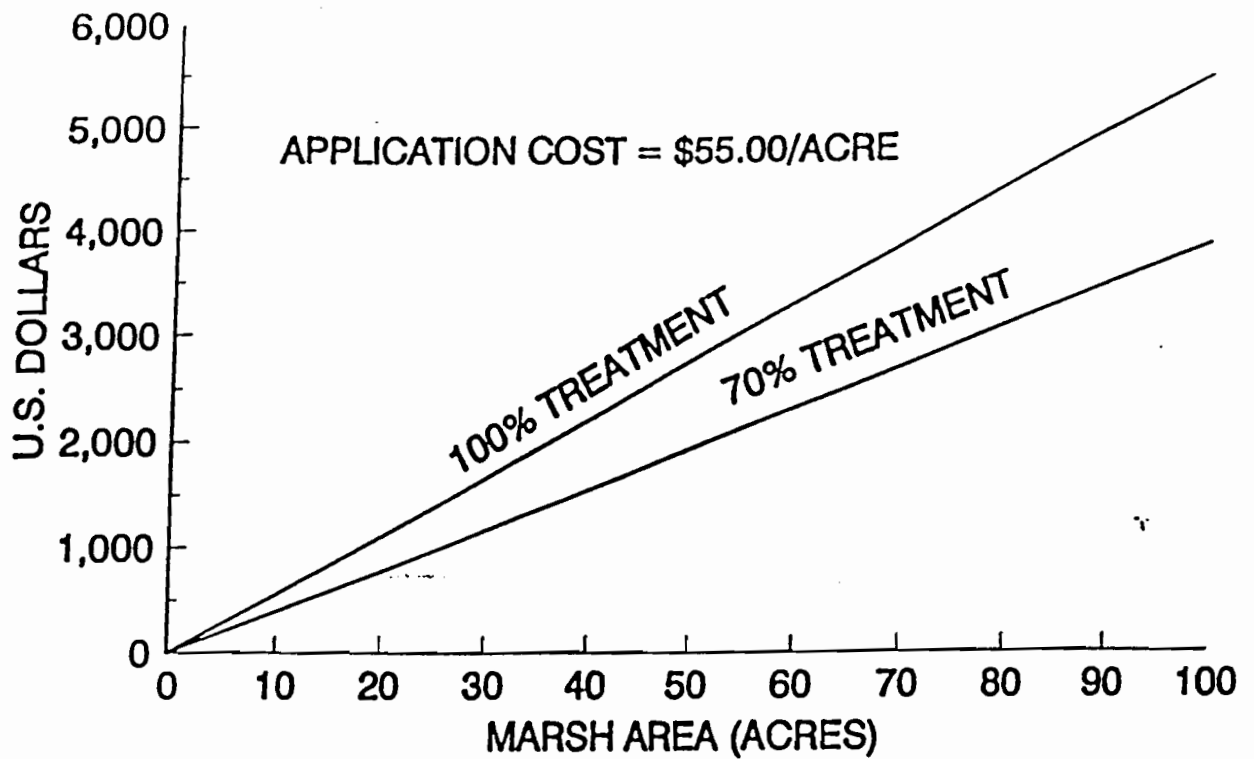


Fig. 3. Cost of aerially spraying cattail marshes with Rodeo<sup>R</sup> herbicide.

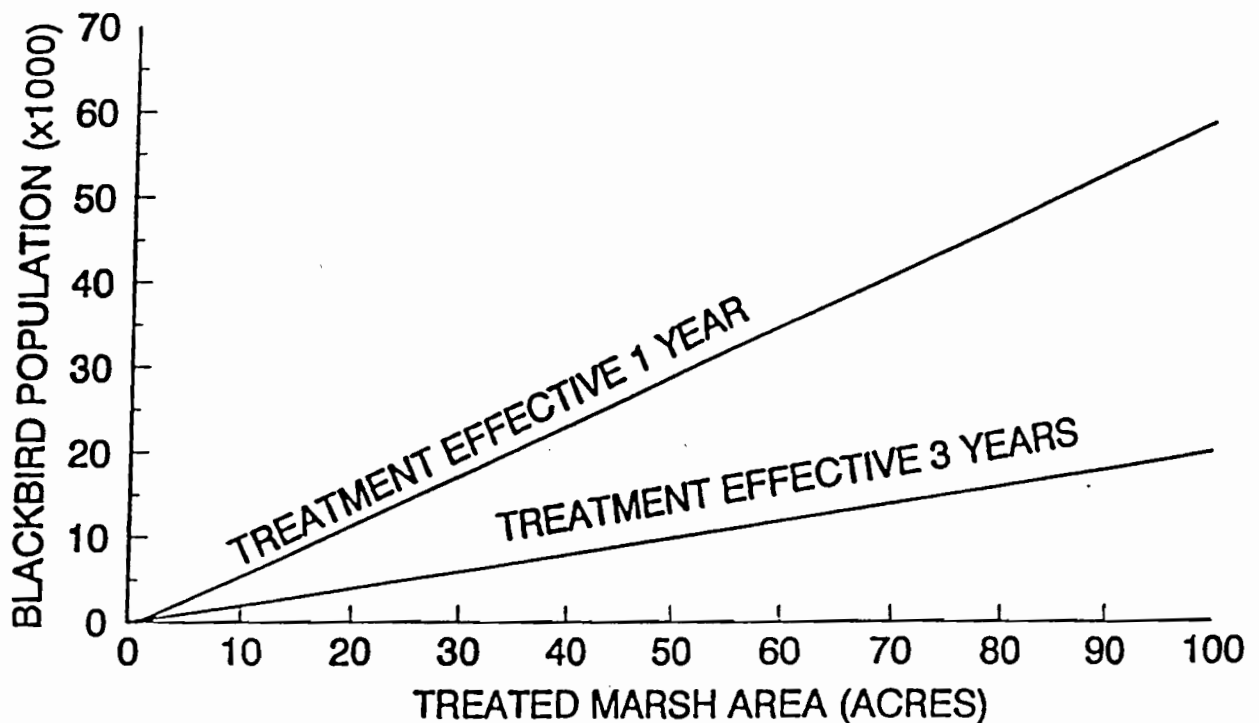


Fig. 4. Marsh area that can be treated cost-effectively with Rodeo<sup>R</sup> herbicide in relation to number of blackbirds using the marsh. Assume that each blackbird consumes 1/3 oz sunflower/day for 45 days.